

Job Charnock's tombstone with the pypersthene-granites of the Madras Presidency; and from its proximity to the coast and to Madras, it seems likely that Pallavaram would have been selected by the earlier agents of the East India Company as a source of this handsome rock. Nearly all the old tombstones collected together in St. John's Churchyard are of the same rock; for example that of Job Charnock's son-in-law, Jonathan White (1703), and Mrs. Jane Smart (1753).

Briefly, the points in which these rocks agree with those of Pallavaram, and upon which I base this identification, are these:—

(a). *Structure*:—

- (1). Micro-perthitic structure.
- (2). Granophyric (micro-pegmatitic) structure.

(b). *Composition*:—

- (1). The presence of potash-felspar in the form of microcline.
- (2). „ „ hypersthene.
- (3). „ „ blue quartz.
- (4). „ „ almandine garnet.

(c). *The combination* of these minerals with the above-named structures. In this association hypersthene is especially note-worthy for the reasons already stated.

As this is a new type of rock, and modifications of it occur by the introduction of accessory minerals, I would suggest for it the name *Charnockite*, in honour of the founder of Calcutta, who was the unconscious means of bringing, perhaps, the first specimen of this interesting rock to our capital.

On a slab of Chinese agglomerate lava bearing a Chinese inscription discovered in St. John's Churchyard, Calcutta. By T. H. HOLLAND, A.R.C.S., F.G.S., Geological Survey of India.

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(With Plate VII.)

Through the kindness of the Revd. H. B. Hyde, I have been enabled to examine the slab bearing a Chinese inscription and discovered by him in St. John's Churchyard.

The slab has been imperfectly polished on the face bearing the inscription, and at first sight presents the character of a common artificial concrete, for which I at first mistook it. But on removing a fragment from the back of the slab and examining it in the laboratory, I found it

to be a siliceous lava, which, though of course formed by natural means is, indeed, comparable to a concrete in ways other than appearances. It is a rhyolitic lava of a kind occurring in different parts of China, which, previous to consolidation, has included fragments of other rocks and now presents the patchy appearances of the agglomerate lavas and piperinos described by Fritsch and Reiss as varieties of eutaxite.*

Thin slices examined under the microscope leave no doubt as to the nature of the rock :—Corroded quartz-crystals embedded in a cryptocrystalline and microlitic magma are scattered irregularly through the slide. Occasionally these preserve in part their original bi-pyramidal outlines, but the magma has corroded the majority of the crystals into irregular shapes. A curious feature worthy of record is the way in which many of the quartz-crystals are traversed by a series of cracks without discoverable regularity. These cracks recall the tessellated appearance of the polysynthetic porphyritic crystals described by Gen. McMahon in the eurite of Tushám Hill, 85 miles north-west of the town of Delhi.† But as a rule, in the present instance, the small fragments, although separated from one another by a series of cracks, all have the same optical orientation, whilst in the Tushám specimens the grains are, according to Gen. McMahon, oriented in different directions. I have found, however, one case of a quartz-crystal in which, after the formation of the cracks, many of the fragments have been slightly displaced, so that whilst the position of extinction is the same for the individuals in some of the pairs, others show slight differences, and still others have been moved through several degrees. Gen. McMahon explained the structure of the quartz-crystals in the Tushám rock as the result of rapid cooling after eruption, and I think the present case, in which many of the crystals are simply cracked more often without displacement of the fragments, are certainly more easily explained in this manner than by the other suggestions which, in his paper, Gen. McMahon has considered and rejected. Relief of pressure would also contribute to the same effect. A similar structure can be produced in clear quartz-crystals by rapidly cooling them from a red heat, the crystals becoming white and losing their transparency from a similar cause.

Next to the quartz-crystals in abundance amongst the porphyritic constituents are the felspars, some of which are of a plagioclase variety, and all greatly kaolinized. Black and brown patches of ferruginous material occur as relics of the ferro-magnesian constituents of the original rock. Secondary minerals like chalcedony occur in small quantities infilling cavities.

* *Geologische Beschreibung der Insel Tenerife*, 1868, p. 420.

† *Min. Mag.*, Vol. VIII. (1888), p. 10.

Lumps of andesitic rocks are common as inclusions in the matrix, which in places shows damascened and eutaxitic structures.

The specific gravity of the rock is 2.35. Thin splinters fuse before the blowpipe to a white vesicular glass.

Comparison with Chinese rocks :—The peculiar structures presented by this rock are of especial interest from the way in which they can be paralleled amongst the Chinese eurites and rhyolites. The damascened structure and the included fragments of a similar andesitic rock I have previously described in the Korean acid lavas.*

Amongst the rocks which I have collected in China, there is a specimen of eurite from the Victoria Peak, Hong Kong, in which the porphyritic crystals of quartz are cracked in the same peculiar manner. The feldspars, also, in this rock are in part plagioclastic, and irregular patches of small biotite bundles resemble in shape the ferruginous masses occurring in the slab. But although the Hong Kong rock shows a very distinct flow structure, the groundmass is composed wholly of microgranulitic material, and there is a notable absence of the andesitic foreign inclusions. Whilst, then, the porphyritic constituents of the slab agree with those of this rock, the groundmass shows that the conditions of consolidation were different; but although the circumstances of solidification were not the same there seems little doubt that the slab in St. John's Churchyard belongs to the same geological mass as the Hong Kong eurite, and both these are members of the acid series of igneous rocks—granites, granitites †, eurites and rhyolites—which can be traced from the Island of Hainan, north-east through Hong Kong to Foochow, and are repeated in a parallel band which reaches the sea-coast at Chusan, are repeated in the Korea, and possibly represented again by the central granitic axis of Kamtschatka. These rocks probably belong to one petrographical province and are the relics of a great chain of eruptions which took place in East Asia during middle carboniferous times. The granites and eurites are found intruding into the limestones which occur below the coal-bearing series; whilst fragments of these rocks are the principal constituents of the conglomerates which lie at the base of the coal-measures. The out-crop of these rocks is approximately parallel to the general strike of the stratified series, following the directions of the principal mountain ranges, which in East China Pumpelly has described

* *Quart. Journ. Geol. Soc.*, Vol. XLVII. (1891), pp. 176–178.

† The prevalence of granitite and the occurrence of its representatives amongst the hemicrystalline and felsitic rocks are striking features in these Chinese rocks, and I regard them as a later stage in the eruptions which first gave rise to diorites and andesites—rocks which I have frequently found associated with and included in the later acid eruptions of China.

